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The Deaner Study
Clausen-Fineman-Henry-Wohl

Where Is A Child Educable?
Alprin

Hebb's Theory and Learning
Benoit

Sheltered Workshops (II)
Wallin

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"for the practicing professions concerned with mental retardation"

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Editorial:

Conferences, Conventions and Common Sense

The usual rash of meetings that appears each year with the advent of Spring is again upon the practising professional worker. In the midst of busily meeting the demands for the services he may render, he is faced literally with notices of a myriad of conferences, conventions and workshops each of which contains an element which might make it desirable for him to attend—other things being equal. But other things are not equal. He could not possibly attend all or even most of the possible events. Yet he must attend some to keep abreast of the progress in his field.

These convenings fall into several recognizable types. There is the professional-political gathering where the main purposes obviously rotate about a group of aspirants for official organizational titles. Some of this tends to exist at any convention. Somewhat of the same level is that meeting which concentrates on the welfare of the group.

More professional in tone is the meeting where each speaker tells what he or his group is doing. This can run from a detailed technical explanation to a rambling description of a group or agency program which may add little to what he already knows. Another familiar type offers speakers who presistently avail themselves of the conditional tense, pointing out what we "should" be doing. Usually these neglect the necessary detail to assure us that the speaker or anyone else could carry on as advised.

In an attempt to be more practical, the workshop meeting in its better form offers a group of persons prepared individually before convening so that their presentations are most pertinent to the topic at hand. Yet this is a "talking" meeting and on occasion can revert to one where we are again confronted by what we "should" do.

Probably the most professionally practical effort, is the clinical demonstration, more frequent in medical fields, probably the most difficult type because it is the most specific, yet offering most to the practising professional worker.

All these meetings prepare reports and our desk is usually covered with printed material. Printing no longer designates professional worth and much should not be given such permanence.

Whatever the conference, the main reason for its being is to cause us to return to our work with ideas for improvement and progress. If these do not appear in time, the trip to the gathering was mere exercise. For those of us who work to find answers to unknowns, it becomes our duty to demand more meetings which result in these new enthusiasms and new ideas and to boycott quite freely many whose purpose for getting together hardly pays us to leave our busy work schedules.

W. J.

The Effect Of Deaner (2-Dimethylaminoethanol) On Mentally Retarded Subjects[1]

johs. clausen, milton fineman,
charles e. henry and norma wohl

With very few exceptions, the condition of mental retardation is not amenable to therapeutic procedures. The recent advances in drug treatment for mental illness have not made remarkable inroads on mental retardation, at least not with regard to the primary symptom of the condition, namely the deficient intellectual standard of the individual. Recently, however, Riker Laboratories have marketed a drug, 2-Dimethylaminoethanol, under the trade name Deaner, which is regarded as a precursor to acetylcholine in the central nervous system, and which has been reported to increase power of concentration, increase span of attention and result in more affable mood. Lemere and Lasater (1958) found this agent to be effective with neuasthenia and mild depression. Oettinger (1958) reported that in a group of 108 nonepileptic children with behavior disorders, Deaner proved beneficial in 68 per cent in that the children acted in more socially accepted patterns and learning in school was improved. Palmer and Wright (1958) administered Deaner to eight mentally retarded children and found increase in attention span, decrease in restlessness or increase in activity in previously hypoactive children, increase in ability to read, write and perform tasks requiring muscular coordination and decreased variation in mood, making the children happier and more cooperative with greater poise.

In the so-called organic type of mentally retarded subjects a high degree of distractability is assumed to be a general characteristic. A major proportion of the population of The Training School consists of such cases. Furthermore, with improved facilities for the mentally retarded children in the public school systems, we find that an increasing number of our population have emotional problems in addition to their status of mental retardation. Consequently we were interested in knowing whether the administration of Deaner to a sample population would reduce distractability and reduce emotional tension.

JOHS. CLAUSEN, PH.D., is Chief of Psychological Research, The Training School at Vineland; MILTON FINEMAN, M.D., is Staff Physician, The Training School at Vineland; CHARLES E. HENRY, PH.D., is Director of EEG Laboratories, Institute of Living, Hartford, Conn.; and NORMA WOHL, M.D., formerly Staff Psychiatrist, The Training School at Vineland, is now associated with the Institute of The Pennsylvania Hospital, Philadelphia, Pa.

In this study of the effect of Deaner on mentally retarded children we wished to probe beyond the level of clinical impression. Laboratory tests of blood and urine were included primarily as safety measures to detect adverse effects of the drug. Neurological examination and EEG were used to detect central nervous system changes, as this agent is supposed to be a precursor of acetylcholine. Tests for sensory, motor, and perceptual functions were selected to determine whether any changes resulting from Deaner were limited to certain specific functions, or whether they were of a general nature. Intelligence tests were administered because such tests are designed to measure the primary symptom of the condition. Behavior rating scales were employed to quantify changes which might occur in areas of activity, mood, appetite and sleep.

Procedure

All the subjects of this study had a neurological examination consisting of the following observations: a cursory evaluation of mental status, speech impediment and handedness was made, along with gait and coordination, posture, Rhomberg test and finger to nose test. Motor system was evaluated for symmetry, weakness and involuntary movements. The biceps, triceps, supinator and Achilles tendon reflexes were tested along with the plantar reflex. Cranial nerves were examined to include a rough evaluation of visual and auditory acuity. Subjective testing of sensation was attempted for touch, pain, position and vibration. This examination was repeated at the conclusion of the second level of Deaner dosage. In addition to the above evaluation an attempt was made to observe for the presence of the "soft" neurological signs as expounded by Bender (1952). Those children receiving drugs were examined for blood count (white and differential count), hemoglobin, hematocrit, serum bilirubin, bromsulphalein retention and routine urinalysis including test for bile.

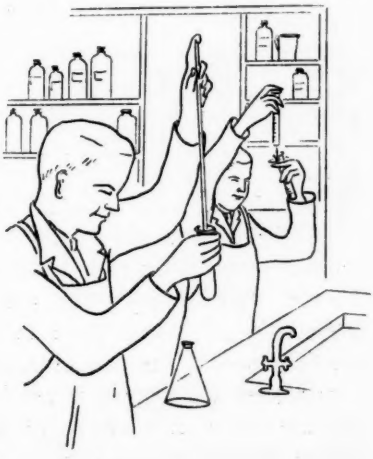
EEGs were recorded on an 8-channel Grass Model III instrument, using 15 electrodes in a variety of monopolar and bipolar arrangements. Most of the subjects were able to hyperventilate but sleep and photic stimulation were not always possible.

The battery of psychophysiological tests included the following items: [2]

1. Threshold for Speech, a relatively pure sensory measure, yields a hearing threshold expressed in decibels. List A and B of the auditory test from the Central Institute for the Deaf were used.
2. Lower Arm Movement measures the speed of movement when the subject is touching in succession two metal plates, 10 inches apart. The subject executes the move on his own initiative rather than as a response to a signal. The score is the median of 10 trials, expressed in ms.
3. Simple Visual Reaction Time is measured in standard fashion where the subject releases a telegraph key in response to a light signal. The score is the median of 20 trials, expressed in ms.

4. Heath's Railwalking Test is a measure of gross bodily movement. Standard procedure was used, as described by Heath (1942).
5. Mirror Drawing requires modification of existing eye-hand coordination, and involves motor as well as conceptual functions. The apparatus used consists of a star pattern stamped out of a brass plate. The following three scores were obtained: Total time in sec., Error count, and accumulated Error time in sec. The star pattern was traced three times and the mean of the three repetitions constitutes the score.
6. Critical Flicker Fusion (CFF) reflects the efficiency of the visual system to resolve repetitive stimulation. A modification of the Krasno-Ivy Flicker Photometer was used. Instead of a continuously changing flicker rate, the rate was varied in discrete steps of 0.5 cps. The mean of two increasing and two decreasing series, in cps, constitutes the score.
7. Span of Apprehension measures the number dots which a subject can perceive in a single presentation. Tachistoscopic presentation and the psychophysical Method of Frequency was used.
8. Identification Threshold records the exposure time in ms. which is necessary to identify a picture of a familiar object. Using the Method of Limits the exposure time was increased in steps of 5 ms. Two equivalent sets of pictures were used alternatingly at the four sessions.
9. Prolonged Foreperiod Reaction Time is a method of measuring sustained attention. The technique is the same as Simple Visual Reaction Time, except that foreperiods of 2 to 14 sec. are introduced in random order. The score is the median of 20 trials.

The intelligence tests used were selected items from the WAIS and the WISC. Because of a wide range in MA in our subjects both forms had to be used. Any one subject was given the same form for all trials. From the WAIS the following subtests were selected: Digit Symbol, Picture Completion, Arithmetic, Similarities and Digit Span. From the WISC: Arithmetic, Similarities, Digit Span, Picture Completion and Coding were included. The subtests were chosen to include those which are least modified by practice effect; they give a score for Verbal IQ, Performance IQ and Full Scale IQ.



The rating scale was adapted from King (1954), using the items which seemed appropriate for the present situation, namely; effort, attention, verbalization, cooperation and rapport. Five items were added: sleep, appetite,

activity, affect and hostility. The ratings were done by houseparents and teachers so that each subject was rated by a minimum of two people. Each item was scored from 0 to 40, depending upon the rating assigned.

Subjects

A total of 40 subjects were included in the study. Twenty of these were given Deaner, while the remaining were given matching placebos. Of the 40 subjects, 18 were classified as emotionally disturbed in addition to their diagnosis of mental deficiency. The age range of the total sample was from 11 to 25 years and IQ ranged from 25 to 89. Twenty-six were males and 14 were females. Thirty-six were diagnosed as mentally retarded of the organic type; four were mongoloids. The heterogenity in the sample was intentional in that we considered the possibility that some types of retarded cases might respond better to Deaner than others. Three subjects were lost during the course of the study; one left the school, one was transferred to a mental hospital and one was discontinued because of unmanageable fits of temper tantrums. All three subjects were in the Placebo group.

The 40 subjects of the study were arranged in matched pairs. For the purpose of matching, sex, age, IQ, emotional status and etiology were considered. From each pair the Head Nurse of the institution selected randomly one member to be assigned to the Deaner group and the other member to the Placebo group. As long as the testing program was in progress the Head Nurse was the only person who knew which of the children were on Deaner and which were on Placebo. Table 1 shows Mean and Range for age and IQ for the four subgroups. They are relatively well matched with regard to IQ but the emotionally disturbed group is somewhat younger than the non-disturbed group.

Table 1

Mean Age and IQ for the Four Experimental Subgroups
Range in Parenthesis

	N	Mean Age		Mean IQ	
Deaner — Disturbed	9	15.2	(12-22)	49.8	(28-73)
Placebo — Disturbed	9	16.3	(11-25)	58.4	(25-89)
Deaner — Non-Disturbed	11	20.3	(11-25)	50.6	(33-72)
Placebo — Non-Disturbed	11	20.8	(11-24)	47.8	(35-70)
Deaner Total	20	18.0	(11-25)	50.2	(28-73)
Placebo Total	20	18.8	(11-25)	52.6	(25-89)

Prior to administration of drug or placebo the total group was examined with all the techniques described above; this is referred to as the Pre-test. The Deaner group was then given a 75 mg. dose, orally administered, the full dosage given in the morning, and maintained on this dosage for four weeks. The control group received matching placebos. During the fourth week the battery of psycho-physiological tests, the intelligence scale and the rating scale were again administered, referred to as the DI test. The dosage of Deaner was then increased to 150 mg. and maintained for four

weeks. During the fourth week of the increased medication the total test program was administered, referred to as the DII test. Finally, six weeks following termination of drug or placebo, the battery of psychophysiological tests, the intelligence scale and the rating scale were repeated. As it was not possible to record EEG at this time, the twenty subjects of the Deaner group had their last EEG about 12 weeks following termination of the drug. The final test session is referred to as the Post-test.

Results

Laboratory Tests: There were no detectable hepatic, renal or hematological effects.

Neurological Examinations: The soft neurological signs as well as any evaluation which involved subjective responses proved to be unreliable since most of the children made great efforts to please the examiner. No significant or consistent pathological effects were noticed.

EEG: All EEG tracings were read in total absence of any clue regarding medication by Deaner, or whether the subject was rated as disturbed or non-disturbed. Furthermore, each tracing was read shortly after it was taken, without reference to findings in the previous tracings on the same case.

There were no EEG changes attributable to the drug. Several subjects showed shifts in the degree and type of abnormality, or in the amount and frequency of the basic alpha rhythm or other components in the record, but these shifts occurred just as often in the placebo as in the experimental group. The basic pattern and amount of dysrhythmia and/or focal abnormality was not altered systematically, nor was the reaction to hyperventilation or photic stimulation. There was no EEG evidence of a toxic effect.

The Deaner and Placebo groups were each subdivided into disturbed and non-disturbed cases as follows:

DEANER		PLACEBO	
Disturbed	Non-Disturbed	Disturbed	Non-Disturbed
9 (6 with repeat study)	11 (9 with repeat study)	8 (5 with repeat study)	11 (all repeats)
3 normal (33%)	6 normal (55%)	3 normal (37%)	3 normal (27%)

Except for a suggestion that more of the cases in the non-disturbed Deaner group had normal EEGs, the distribution is similar throughout all subgroups. Because of uncontrollable factors of degree of cooperation (often poor), variable length and technical adequacy of the records, limited number of sleep tracings, and indifferent cooperation in hyperventilation and photic stimulation, one hesitates to infer anything other than a chance distribution of changes throughout.

There were no differentiating EEG features within the various subgroups. The overall index of abnormality is rather high, ranging in type from excess non-specific slow and/or fast activity, through the various

diffuse dysrhythmias, to clearcut focal seizure discharges in almost any region. The incidence of the latter abnormalities would almost certainly have been increased had sleep tracings been obtainable on all cases under all conditions.

Psychophysiological and Psychometric Tests: In evaluating the data from these tests it should be kept in mind that our expectation was that the test scores should be improved as a result of Deaner. Differences in group means between sessions may result from lack of precision of the testing instrument, from unrelated motivational changes and from practice. Such differences should be demonstrated by the control group, and any effect of Deaner would have to exceed such differences. We would also expect that any genuine Deaner effect at DI would be maintained or increased at DII. Furthermore we would not expect the scores at the Post-testing to be superior to those at DI or DII.

For all tests the standard deviations are substantial for the Placebo groups as well as for the Deaner groups. The magnitude of any mean difference between two groups is such that it does not approach a statistically significant level; this is due in part to the size and the heterogeniety of our sample. We can, therefore, only be concerned with trends, and we have confined our statistical measures to means and standard deviation.

Table 2

Means and Standard Deviations for
Psychophysiological and Psychometric Tests

		DEANER					PLACEBO			
	N	Pre	DI	DII	Post	N	Pre	DI	DII	Post
RAILWALKING										
Emot. M	7	26.0	39.9	36.3	34.6	6	42.5	45.2	44.5	42.7
Dist. O		15.1	18.0	19.8	15.9		22.8	20.1	26.3	24.5
LOWER ARM MOVEMENT										
Total M	20	439	427	415	441	18	438	430	450	460
O		260	292	190	215		193	165	152	196
Emot. M	9	487	492	407	426	7	396	392	411	393
Dist. O		340	392	217	230		163	152	148	189
MIRROR DRAWING - ERROR TIME										
Total M	16	40.6	20.1	15.4	11.4	16	25.3	15.1	10.7	10.1
O		36.3	15.1	14.7	6.6		25.7	15.0	8.7	7.4
Non- M	9	39.7	16.5	15.3	12.6	10	19.6	9.4	7.7	8.3
Dist. O		28.9	9.5	8.5	5.1		18.9	7.5	6.3	5.6
Emot. M	7	41.9	24.7	15.5	9.8	6	34.8	24.5	15.6	13.2
Dist. O		44.0	19.2	11.6	7.8		31.9	19.1	9.9	8.8
MIRROR DRAWING - ERROR COUNT										
Total M	16	100	65	51	41	16	64	46	34	36
O		90	46	54	23		59	33	24	23
Non- M	9	104	59	56	47	10	55	37	31	35
Dist. O		96	43	46	24		43	28	24	26
Emot. M	7	96	73	44	33	6	80	61	39	36
Dist. O		82	48	20	19		76	37	22	18
MIRROR DRAWING - TOTAL TIME										
Total M	16	64.9	33.0	27.2	19.3	16	65.1	45.3	34.2	30.4
O		39.3	15.7	11.6	9.3		39.6	25.2	18.7	14.7
Non- M	9	68.3	29.3	28.8	22.7	10	64.3	43.7	35.2	32.2
Dist. O		33.9	11.0	10.8	8.4		40.4	28.4	23.1	17.7
Emot. M	7	60.5	37.6	25.2	14.9	6	66.4	48.1	32.5	27.2
Dist. O		44.9	19.2	12.3	8.7		38.1	18.5	6.4	6.4

For the sake of economy we have entered in Table 2 only such comparisons which indicate any trace of an effect of the drug. We first compared the Total Deaner group with the Total Placebo group. Inspection of Table 2 shows that for Lower Arm Movement both groups start about the same level, and both improve slightly at DI. At DII, however, the Deaner group continues to improve, while the Placebo group decrease, and at Post they both decrease in relation to the DII score. There might be a slight suggestion here that the 150 mg. dose of Deaner improves the score in a moderate amount. The three scores for Mirror Drawing show faster rate of improvement for the Deaner group than for the Placebo group. Since the initial level of performance is quite different for the two groups, it is difficult to attach any significance to the faster improvement rate for the Deaner group. Of all the psychological tests, Lower Arm Movement and Mirror Drawing are the only tests which might suggest some differentiation between Deaner and Placebo subjects on an overall comparison.

Next we compared Deaner and Placebo subjects separately for emotionally disturbed and non-disturbed groups.

The non-disturbed subjects show practically no changes. All three scores for the Mirror Drawing Test show faster rate of improvement of the Deaner subjects, but again there is a marked difference in initial level between the two groups.

In comparing the Disturbed groups we find some indications of improvement in the Deaner group. The Rail Walking Test shows a marked initial difference between the two groups which is reduced at DI because of rapid improvement of the Deaner group. Subsequently there is a slight decrease but the final difference is appreciably smaller than the initial difference. For Lower Arm Movement there is again an initial difference between the two groups with the Deaner subjects as the poorer performers. This situation is unchanged at DI but at DII there is a marked improvement by the Deaner subjects. Again, all three scores of the Mirror Drawing Test show faster rate of improvement in the Deaner group. With less difference in initial level this might suggest a result of the Deaner treatment. None of the other scores exceed the variability indicated by the Placebo group.

In summary, then, it appears that there are more suggested changes in the Disturbed group than in the Non-Disturbed group and that motor functions seem to be more sensitive to Deaner than are sensory, perceptual or intellectual functions. The consistency of improvement on motor tasks is such that it is unlikely that this improvement is a chance occurrance.

During the testing program the four research assistants who administered the psychophysiological tests tried to identify the Deaner subjects on the basis of general behavior in the testing situation. A score board was set up where each examiner placed a check mark by the name of the subject when he thought that definite improvement in behavior could be detected. This was an informal arrangement and no attempt was made to

make the ratings secret. Upon completion of the testing program there were 8 subjects who had been checked off by two or more examiners. Seven of these had received Deaner, and 5 belonged to the Emotionally Disturbed group. Group Means and Standard Deviations of these 7 subjects were similar to those of the Emotionally Disturbed group, which is readily explained by the substantial overlap of the two groups.

It appears that, despite the minor changes in the specific test scores, several of the Deaner subjects in the Emotionally Disturbed group could be identified. The drug may possibly have some effects which are not reflected in the scores of the objective tests, but the uncontrolled conditions of the examiners' evaluation makes it difficult to place much confidence in this finding.

Rating Scale: Houseparents as well as teachers rated the behavior of the children as it was considered important that at least two people should rate each child. Because the school was out at the time of the Post-session, complete teacher rating was not possible to obtain, and we therefore limited the evaluation of the ratings to the first three sessions. Throughout the comparison of the ratings, we only included those which were made by the same person on the three different occasions. Some of the items of the rating scales have been combined into categories. Category I includes item No. 1, (sleep), II includes item No. 2, (appetite), III includes No. 3, (activity), IV includes 4, 5, 6 and 7, (attention), V includes 8, 9 and 10, (emotional status) and finally VI includes all items from 3 to 10, namely those which concern psychological functions. The results of the comparison of the rated behavior for categories I, II and VI are presented in Table 3.

Table 3

Results of the Rating Scale; Various Combinations of Items

	DEANER TOTAL			DEANER DISTURBED			DEANER NON-DISTURBED		
	Pre	DI	DII	Pre	DI	DII	Pre	DI	DII
I	32.9	34.7	36.0	34.3	28.6	31.4	40.0	40.0	40.0
II	30.0	35.0	33.8	32.5	37.5	37.5	27.5	32.5	30.0
VI	26.6	27.4	25.5	26.1	26.4	23.3	27.1	28.3	27.5
	PLACEBO TOTAL			PLACEBO DISTURBED			PLACEBO NON-DISTURBED		
	Pre	DI	DII	Pre	DI	DII	Pre	DI	DII
I	37.3	34.7	38.7	32.0	32.0	36.0	40.0	36.0	40.0
II	35.7	34.3	37.1	36.0	32.0	36.0	35.6	35.6	37.8
VI	28.1	29.1	29.4	27.9	29.5	30.2	28.3	27.9	28.7

From Table 3 it appears that in the Total Deaner group there may be a slight gradual increase of sleep and a possible improvement of appetite, but the changes for both are moderate. None of the other categories show any systematic change. The Non-Disturbed Deaner Subjects in comparison to Non-Disturbed Placebo Subjects show a possible increase for only one category, namely appetite. The Disturbed Deaner Subjects in comparison to Disturbed Placebo Subjects show the same trend, an increase in score for appetite which surpasses the fluctuation in rating for that of the

Placebo cases. The other categories do not show any more changes or fluctuations than do the Placebo group.

The conclusion is that with a possible exception for appetite, the rating scale did not indicate any changes due to Deaner.

Discussion

From the essentially negative results of this study it does not appear that Deaner improves power of concentration or increases attention span in mentally retarded subjects. The lack of change cannot be accounted for by the size of the dosage (75 mg. per day for 4 weeks plus 150 mg. per day for another 4 weeks) which is considerably larger than ordinarily prescribed. The Laboratory tests used in this study indicate that Deaner is a safe drug in the doses used.

There are two suggestions in the data that might be worth further investigation. The first is that there are more indicated changes in the disturbed group than in the non-disturbed group. One might speculate that the drug has a tranquilizing effect and therefore reduces tension in the testing situation, thus making it possible for some of the subjects to operate more efficiently. The second suggestion is that psychomotor tests are the only ones which show a tendency to improve as a result of Deaner. This might give rise to the hypothesis that Deaner, reportedly a precursor for acetylcholine, may affect the neuro-muscular junctions rather than the CNS.

It is somewhat puzzling that the functions measured by the rating scale should be so completely unchanged during the Deaner treatment, while the research assistants were able to identify a fair number of the children who were receiving Deaner. The scoring board used by research assistants was not properly controlled, and they might have been influenced by each other's judgement. Nevertheless, there seems to be a discrepancy in the result of the rating scale and the result of the scoring board. The explanation for this might be that it is easier to evaluate in an unstructured situation, where one may state that there is a difference in the person without having to specify what the change consists of.

We suspect that the improvement observed by some examiners for some cases in the testing situation is more compatible with a possible tranquilizing effect of Deaner.

Summary

This study represents an attempt to evaluate the effect of Deaner on a group of mentally retarded children. Twenty subjects received Deaner and twenty received matching placebos. Nine subjects in each group were classified as emotionally disturbed. The two groups were matched for sex, age, IQ, emotional status and etiology. Age ranged from 11 to 25 years and IQ ranged from 25 to 89.

The experimental group was given 75 mg. Deaner each day for 4 weeks following which they were given 150 mg. daily for 4 weeks.

The evaluation program included laboratory tests of blood and urine, neurological examination, EEG, tests of sensory, motor and perceptual functions, intelligence tests, and behavior rating scales to assess levels of activity, mood, appetite and sleep.

The evaluation program was administered before drug treatment, at the end of the 75 mg. period, at the end of the 150 mg. period, and six weeks after termination of drug or placebo.

In general we failed to find changes which could be attributed to the effect of the drug. There were some suggestions of a few of the motor scores being improved, particularly in the emotionally disturbed group. Also, based on an overall impression, the research assistants who administered the psychological tests were able to identify several of the emotionally disturbed Deaner subjects.

It is our tentative opinion that the few suggested changes may be explained by assuming a tranquilizing effect of Deaner, rather than a specific improvement in concentration or span of attention.

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1. *This study was supported in part by a grant from Riker Laboratories.*

2. *These tests were selected from a larger test battery utilized in another research project. Details about the techniques and procedures of these tests will be described in a later paper.*

Where Is A Mentally Retarded Child "Educable"?

stanley i. alprin

In 1959 there were 686 special classes for "educable or mildly retarded, children in the public schools of New Jersey. If these classes were filled to legal capacity, the enrollment would have been 10,290. During this same year the total public school enrollment passed the one million mark. This means that approximately one percent of our pupils were enrolled in these classes. According to authorities in the field of mental retardation, however, somewhat more than two percent of our school age population is mentally retarded and should be placed in special classes. Quite obviously, then, no more than half of our mildly retarded children are being educated in this manner.

What is *your* opinion regarding the education of mildly retarded pupils? Should all retarded children be in special classes? It is hoped that the following comments will serve to help educators — particularly supervisory and administrative personnel — deal more effectively with this very real problem.

Viewpoints Vary Regarding Placement

Some educators would insist, on the one hand, that the regular class cannot be all things to all children. Because of the nature of their disability, mentally retarded children need a special program in a special class. If retarded children are to develop their limited potentialities, they should not be subjected to the more rapid pace of the regular classroom. If the so-called normal and brighter pupils are to progress at their optimum rates, the teacher should not be handicapped by having to make provisions for such slow pupils. This point of view is by no means new, although it has recently been resurrected and given added stature.

Other educators believe that the regular class *can* be all things to all children. The mentally retarded child's learning disability is not so unique that a special class program is needed. Children should progress at their own rate; instruction can be tailored for children of varying abilities. Most important, if we are to reach our democratic ideal, children from various backgrounds and with different abilities must have many opportunities to work and play together. While this point of view never found a

Stanley I. Alprin is the Supervisor of Child Study, Division of Curriculum and Instruction, Office of Special Education, Department of Education, The State of New Jersey.

great many adherents, it has made a rather significant impact on educational thought during the past generation or so.

Admittedly, the two positions are over-simplified and to some extent exaggerated. Basically, however, they represent the viewpoints of many educators. Using the figures cited above, one group would say, in effect, that about ten thousand mentally retarded pupils in New Jersey are not as yet being provided with the special class program which they need. The other group would say, in all likelihood, that there are already ten thousand children in special classes who can and should be properly educated in the regular program. There are some school officials, unfortunately, who do not have any convictions one way or the other, and whether or not retarded children are placed in special classes is often a matter of personal expediency.

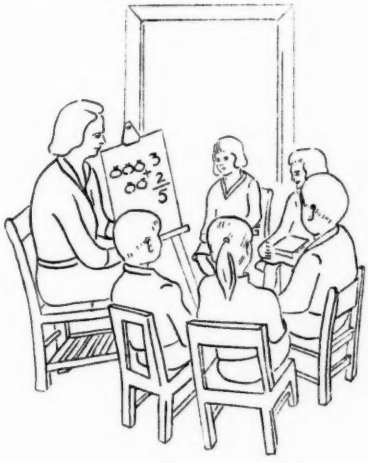
Another point of view, and that held by the writer, maintains that *some* mentally retarded pupils need the kind of program provided by special class placement, while other retarded pupils should be educated in the regular program. The child and his school are carefully studied to determine which of several possible placements will most adequately meet his needs. Whether or not a mentally retarded pupil is "educable" depends on the needs of the child, and the ability of the regular program to meet these needs. This seems to be a more realistic approach to educating retarded children.

In New Jersey a mildly retarded pupil is "educable" when he cannot be accommodated in the regular program. To quote directly from the law: "Each board of education shall ascertain what children between the ages of 5 and 20 in the public schools of the district cannot be properly accommodated through the school facilities usually provided because of the extent of their retardation and shall classify such of them as are educable . . . . ."[1] In other words, *there are no absolute standards or criteria by which a child can be classified as educable, although he may be mentally retarded.*

This places a great responsibility on all who are involved in ascertaining whether or not a child can be properly accommodated. Certainly, we need to know a great deal about the child's disabilities, potentialities, and relationship with his parents. In addition, however, we must somehow appraise the regular program, and determine whether this child can receive a suitable education by remaining in it.

An example may serve to illustrate, in part, the complexity of the problem facing the psychological examiner, for it is this person who is charged with the responsibility of administering the procedures of diagnosis and classification. The philosophy of school "A" is such that individual differences are highly valued, and every child is helped to feel that he is an important member of the school community. The teachers are experienced and trained in the methods of child study. Each classroom is well-stocked

with a variety of equipment and materials. Enrollments are kept between twenty and twenty-five in each class. George, a pupil in this school, is in fourth grade. It is determined that he is mentally retarded. The teacher feels that it will be to the boy's advantage to stay in the regular program, and the school psychologist helps her plan a suitable program for him.



The following year George moves to another community. His teacher is inexperienced and holds a sub-standard certificate. There are thirty-eight other children in his room. Equipment and instructional materials of all types are in short supply. For the next three months George "sits" until the psychological examiner classifies him as educable and recommends that he be placed in a special class. It seems obvious that in school "B" George cannot be accomodated in the facilities usually provided, and must be placed in a special class. In this case, educability is a very relative term.

It does not follow that school "A" would have no occasion to classify certain children as educable. Quite the contrary would be observed. For example, Susan is not only very slow, but she has a number of other handicaps as well. Her teacher wisely recognized that she needed a program that was entirely different from anything that he could provide. The psychologist concurred with this opinion, and Susan was placed in one of their special classes for educable children.

Even under ideal circumstances the regular class cannot be all things to all pupils. The writer believes, however, that many of the pupils now placed in special classes could be properly accomodated in the regular program of a school such as "A" above. On the other hand, there are probably many retarded children presently placed in regular programs who are in desperate need of special class placement.

One does not need to have particularly good vision to notice that the number of schools like the one to which George transferred is increasing.

There are more than six thousand teachers currently holding sub-standard certificates; building programs are frequently not keeping pace with expanding enrollments; adequate supervision of teachers is still a luxury that few communities can afford; many types of necessary equipment are red-penciled for lack of funds. To make matters worse, the current national emphasis on science, mathematics, and foreign languages has forced many teachers to pay even less attention to their retarded pupils then they did previously. Many children now placed in the regular program need the protection and encouragement found in our special classes.

The Role of the Psychologist

One other very important point needs to be considered. We have already stated that the psychological examiner plays a vital role in determining which children should be placed in the special class program. It is this person who, according to the law, must administer the procedures of diagnosis and classification. Let us not be naive and assume that there are fewer individual differences among examiners than among teachers. Psychologists vary widely in their ability to study and evaluate human beings. This is not idle gossip; the writer is familiar with dozens of cases that have been inadequately evaluated and incorrectly classified. Unless school officials take the time to learn more about how psychologist should function in a school setting, this situation may not improve.

First of all, a "team" approach is mandatory to proper evaluation. The administrator who believes that educability can be determined by giving a few intelligence, achievement, and personality tests, is ill-advised. Information is needed from many sources: the teacher, the parent, the nurse, the principal. This information should be pooled and analyzed, and a staff conference should be held to determine suitable placement.

Secondly, it takes time to study and evaluate children. It may be absolutely essential that a teacher keep anecdotal records pertaining to specific types of behavior. The psychologist may not have established rapport with the child, and the low test scores may be a reflection of this, rather than a lack of intelligence. Even in the unusual situation where detailed records have been kept, it would be impossible to obtain a really comprehensive picture of a child in less than one day. And yet, examiners are "evaluating" three, four, five, and six children daily.

Thirdly, it is imperative that the examiner fully understands the relativity of the term "educable". If his perception of the child is drawn primarily from a battery of psychological tests, the ultimate placement of the child will depend on how well or how poorly he performed on these tests. It was pointed out, however, that the examiner must, in cooperation with other members of the staff, appraise the overall quality of the instructional program in the regular class, and determine whether or not a specific child, having a specific disability, can function in this class.

Finally, the placement of a mentally retarded child in an educable class does not relieve us of further responsibilities. Our procedures for evaluation and diagnosis are not so highly refined that we can eliminate all errors of judgment. The child may change and the instructional programs may change, and consequently we may wish to re-examine the child's current placement.

If the point of view expressed by the writer is acceptable, we must recognize that it will not develop in a vacuum. In the final analysis, it is the school administrator who must assume the major responsibility for developing the kinds of competencies needed in the evaluation and education of mentally retarded youngsters. He must insist that each child referred to the psychological examiner be studied in a way that is consistent with the above suggestions. He must make every effort to develop the kind of staff that believes whole heartedly in the present worth and dignity of every child. He must recognize that special class placement for many children is but an expediency, and that every effort should be made to remove the need for such expediencies. Then and only then can he be reasonably certain that mentally retarded children will receive the best possible education, in the regular program or, when necessary, in a special class.

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[1] Section 18:14-71.2, Title 18, New Jersey Statutes Annotated.

Application of Hebb's Theory To Understanding The Learning Disability of Children With Mental Retardation[1]

e. paul benoit

In December, 1958, the author joined in a meeting of the American Association for the Advancement of Science at Washington, D. C. The aim of participants was to present data in support of specific hypotheses or theories. However, it was the frank purpose of this paper merely to define Hebb's (1949) neuropsychological theory of behavior and its implications for understanding learning in mentally retarded children.

Current theorizing in the field of learning supposes that learning is effected essentially in the nervous system, and that it is furthered or impeded as a function of qualitative and quantitative changes in the neural apparatus. While basic research in neurology has come up with many discoveries about the structural and functional characteristics of neural tissue, psychologists have tended to deal with learning without availing themselves of this information. Among others, Hull (1943) has explicitly been content to regard the central nervous system pretty much as a mere little black box in which stimulus-response connections are built up.

Hebb's view of learning is distinguishable from that of his predecessor's in a number of major ways, but perhaps the most outstanding point of difference in the eyes of the behavioral engineer is that he takes into account the nature of the central nervous system. Since human beings learn with a mechanism that has a number of known features, he assumes that a more meticulous respect of these is likely to facilitate learning, in much the same way as pen manufacturers produce more efficient pens by considering the contours of the hand.

Still another point of difference is Hebb's broader view of the phenomenon of learning. Hull was concerned with the formation of associations between stimuli and responses. Hebb's formulation goes back formally to the initial processes of perception and attention, and the derived process of memory; and he visualizes these phases as points where learning can be promoted.

These two areas of emphasis are decidedly not treated as crucial in speculations on learning as such. Today, Osgood (1953) and Jenkins (1952), among others, do not go much beyond describing learning in terms

E. Paul Benoit, Ph.D., is Co-ordinator of Research, The Partridge Schools and Rehabilitation Center, Springfield and Gainesville, Virginia.

of the development of a mediational process which represents and accounts for observable responses. Staying on this plane, they are able to bring out a large number of useful operational laws of associative learning.

However, these two peculiarities of Hebb's behavioral theory—concern for neurology and perceptual foundation—are of marked relevance to learning in the mentally retarded. For this group, it is imperative that we explore every possible way of maximizing functionality.

Brief Outline of Hebb's Theory

Hebb begins with the concept of cell-assembly, which he sets forth as the basic mechanism of sensory and motoric response, and the neurological counterpart of psychological experience. He assumes that the impinging of a stimulus on a sense organ activates a chain of cells, distributed mostly in the upper portions of the central nervous system; he reasons similarly regarding motoric impulses. Repetition is viewed as strengthening intercellular bonds through the enlargement and multiplication of synaptic knobs by some kind of neurobiotaxis, very likely at a rate and to a limit that jointly suggest a typical biological exponential curve. This type of growth derives some support from the evidence that postulates a structural change to account for the facts of memory.

The cell-assembly concept leads one to infer that its formation requires an optimal extension and intensity of stimulation on the receptor surface and also optimal excitation in the correlated structures in the neural centers. Already both the nature and the origin of cell-assemblies recommend adaptations that are likely to enhance perceptual efficiency and stabilize attention.

Once constituted, cell-assemblies become the essential building blocks in associative learning of progressive degrees of complexity. At this point, the primitive perceptual structures co-operate to generate integrators. Such an organizational structure develops when two or more stimulations repeatedly occur in close temporal proximity; the firing of the perceptual structures tends to foster the development of a higher-order structure, so that the occurrence of one perceptual act may cause the transmission of excitation through synaptic bridges into the associative structure, and through it deliver facilitation to the other subordinate perceptions, even in the absence of the appropriate stimuli.

The superordinate structure is postulated as consisting of the interconnecting neuronal elements and new cells recruited along the way; it may also include neural elements common to the subordinate structures, as the basis for the perception of partial identities.

The formation of organizational structures is assumed to proceed progressively, as new percepts or more involved perceptual complexes are acquired.

At this point, one may suppose that gradual rise in integration is not independent of the condition of the central nervous system, but that an upper limit is set by the total mass of healthy neural tissue.

It may further be noted that both subordinate and superordinate structures extend into both the sensory and motor segments of the central nervous system, so that motoric elements lend facilitation to related sensory structures, and *vice versa.*

Hebb's formulation, presented in rough summary, is hopefully intended to account for all the facts of learning. Hebb himself has attempted to show its fertility by applying it to various departments of behavior. More recently, it was extended by Bousfield (1953) to explain many facts pertaining to clustering in verbal behavior.

Application to Learning in the Mentally Retarded

Hebb's theory is highly pertinent to the mentally retarded, because of its concern for making the most of impaired neurology. Crowbars vary in strength, but efficiency can be increased by adjusting the fulcrum point to best advantage. Hebb's thought is significant because it subsumes established rules of thumb, and calls attention to further manipulations in the learning situation.

Anyone familiar with the original work of the two great pioneers in the teaching of retarded children, Seguin (1866) and Itard (1932), knows that they furthered their success with the children by using larger materials, e. g., alphabet, pencils, tools. As was noted above, Hebb's theory assumes that spread of stimulation at the sensory surface is associated with a more abundant excitation in the higher centers of the nervous system, and that perceptual structures arise more readily; superordinate structures emerge more easily because there is then a greater number of points at which interfacilitation can take place. Optimal maxima have yet to be determined experimentally.

This general principle suggests several adjustments regarding teaching content. Initial training obviously should be thing-oriented, because of the opportunity thereby provided for fuller cortical participation. If thing-percepts are well established, it is then easier to link them with words; these are clearly more difficult to recognize than things, because of their more constricted configurations as stimuli. The matter of optimal mobilization of the cortex in this area presents a problem of prohibitive proportions. One can, for example, helpfully enlarge the stimulus field in a few ways, e. g., by exaggerating slowness and distinctiveness in the adult's speech, by sharp inter-word contrasts (negatively, by avoidance of confusing homonyms). Finally, the theory cautions against the careless inclusion of reading in the children's curriculum. After they have managed to succeed in the difficult task of extending their knowledge by associating a large number of auditory symbols with familiar objects, it may not be wise to launch into the deeper waters of symbolism by trying to teach too many associa-

tions between written and oral symbols. The written word is two steps away from the object; learning here operates on the level of markedly circumscribed stimulus patterns, and involves the association of auditory and visual percepts, with the latter group having far less opportunity for reinforcement than the former.

Closely related to the above principle regarding spread of stimulation is the frequently underscored advantage deriving from the multiplication of sensory modalities or dimensions in a given perception. Thus, emphasizing distinctiveness of both design and color has been shown to aid the learning of the alphabet. The use of audio-visual aids is recommended on the same basis at every level of learning. Further propping can be provided by enlisting the autonomic nervous system, viz., by arousing desires in line with the teaching aims.

Several decades ago, Grace Fernald (1943) demonstrated that the slow learners picked up speed in learning to recognize words by tracing the letters with finger or stylus. Hebb's system leads one to infer as much: by engaging more cortex, viz., by including the motoric portion of the brain, more opportunity is provided for interfacilitation. The same logic applies to do-it-yourself practices, the follow-through of projects, the carrying out of instructions, even the vocal recitation of thought sequences.

The need of motoric support makes one wonder to what extent the children's handicap might be accentuated by the curtailment of opportunities for self-help in cases of overservice on the part of protective adults. Many experimental studies have shown that stimulation privation diminishes response capacity even into adulthood in animals.

Some twenty years ago, Alfred Strauss (1947) dealt with the problem of distraction in organically impaired children by insisting on the artificial simplification of the stimulus situation. According to Hebb, attention is controlled through the delivery of facilitation from one organizational structure to another. Accordingly, the successful induction of new learning may require the eliminating or minimizing of irrelevant stimuli, until interstructure facilitation has been developed enough to permit the easy channeling of in-coming stimulation to the appropriate organizational structures. Hence, the need of simplicity in the learning situation is a function of the level of habit strength and the integration level. Without regard for adaptation of this sort, there is likely to be mass activation of structures and diffuse thinking.

The theory strongly emphasizes the importance of progression in the teaching of new material. Each task must be broken down in terms of acquired elements in the child's frame of reference; else a double task is faced, and progress must be all the slower. Much efficiency is lost in teaching because of lack of sensitivity to units that are appropriate for the individual. Steps must presumably be short, if they are to get the learner anywhere. Undoubtedly much research is needed into the nature of sequen-

tiality in the evolution of behavioral patterns, and into modes of meaningful analysis.

This consideration regarding rate of growth raises two further questions about developmental ceiling and also about early learning. The difficulty of establishing perceptual structures obviously applies throughout the lifetime of the individual; there is reason to stress the early learning, because there is a tendency to underestimate its significance. Every effort must be made to expose the children to all such experiences as may be likely to be within the scope of their readiness, so as to reinforce as many perceptual and organizational structures as possible. Otherwise behavior becomes permanently constrained within the limits of primitive habits. Slow learning necessarily entails the reinforcement of a scanty set of perceptual structures, both subordinate and superordinate. This condition is presumably behind such characteristics as rigidity and stimulus bound behavior. These psychological manacles must be directly counteracted by the proper organization of the learning situation. Perception must be guided with relatively more explicitness.

Drill is recognized as inherently more necessary for the retarded than for the normal by and large. It may well be that a given degree of response strength in organizational structures may call for a high degree of total reinforcement. This deduction leads to the corollary that the limit of complexity in integration is perforce not high in the retarded. It is therefore imperative to stress learning that is within the limits of possibility rather than to try at all costs to rise to higher levels. He who saws boards with many strokes and hammers nails with many blows had better not attempt to build a castle.

Since the level of integration rises so slowly because of the great need of practice, it stands to reason that proper selection be made of materials. There is no point to building a base broader than the height of a tower calls for.

This principle applies to the motoric sphere no less than to the sensory. The retarded are likely to fail in precision activities, in complex sequences; they do better on tasks involving large objects, molar muscle systems, and hence lower level integrations. They should be oriented to such areas of social service in which interpersonal interaction is primary, and the degree of refinement in perception and muscular function is relatively low.

Finally, to cite one more of many points of application, Hebb observes that new associations are built up independently of awareness. The essential condition is the relatively synchronous perception of related elements. Accordingly, incidental learning has a real place for retarded children, especially in situations in which there are problems of distractibility and disinhibition. After a certain amount of repetition at this phase, attention is likely to operate at the conscious level.

Summary of Implications

There is much curiosity regarding the relevance of Hebb's concepts of cell assembly and organizational structures. While they do not appear to contradict known neurological facts, they do involve an embarrassingly large number of postulates that cannot readily be verified. Hence one cannot but wonder about justification for utilizing them. We are entitled to say that the proof of the pudding is in the eating. If Hebb's system of assumptions leads to a useful set of organized hypotheses, we should pursue the line of thought and not be inhibited by excessive concern for operational neatness. The theory has the advantage of taking many procedures, many of which might even be in common use, and of subsuming them under a single set of postulates. Should the hypotheses derived from the theoretical framework be supported by experimental evidence, the likelihood is great that insights would gain in depth. Besides, if one may be allowed a morbid analogy, it is better to look at a skeleton than at a clumsy sack of odd bones—which is pretty much the status of currently educational thinking on the mentally retarded.

The research ideas proposed above suggest an important deviation from current practice. As a rule, basic research in learning is done on highly molecular phases and by means of exceedingly primitive tasks. This approach has not startled the world with its fruitfulness. Perhaps controlled observation in everyday life can enlighten us more than the artificial problem boxes, mazes, and other apparatus of the psychological laboratory.

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1. *Presented at the American Association for the Advancement of Science, Washington, D. C., Dec. 26, 1958; a more expanded statement of these thoughts appeared under the title of "Relevance of Hebb's theory of the organization of behavior to educational research on the mentally retarded,"* in American Journal of Mental Deficiency, *61, 1957, 497-507.*

Sheltered Workshops For Older Adolescent And Adult Mental Retardates

j. e. wallace wallin

PART II

(Ed. Note: Part I of this article by Dr. Wallin was published in the February, 1960 Training School Bulletin, and presented eight specific objectives of a workshop program for the mentally retarded. The following presents specific suggestions for effective implementation of such a program.)

Eight Specific Suggestions for Implementing the Program

1. Effectively screen the applicants or referrals. All the applicants from the schools, social agencies, churches, clinics of various kinds, and from the parents need to be carefully selected. The writer has seen in the training centers visited purely custodial cases, a few patent psychotics (mostly schizophrenics) and preschizophrenics, many behavior cases with uncontrollable impluses, and some normals. The I. Q.'s have ranged from 16 in one center and 19 in another center to an I. Q. of 90. It is important to establish criteria of admission and to obtain the information to implement them. Needed is a synoptic diagnosis based on a comprehensive case study of each individual, involving a physical examination, a psychological examination, a developmental, educational, and family history, and sometimes a psychiatric examination. Some of the larger set-ups may be able to afford the necessary clinical armamentarium. Many will have to depend on cooperating agencies—mental hygiene or child guidance clinics, specialized mental retardation clinics, child study bureaus, medical clinics, hospital records, social service exchanges, and State Departments of Vocational Rehabilitation for those of employable ages.

The selection should not be based solely on the I. Q., on the intelligence age, or on specific aptitude tests, however essential such tests may be. The I. Q. even when validly obtained constitutes merely one item—perhaps the most important single item—of the synoptic diagnosis of vocational potentialities. It is based only on a sampling of a limited area of functioning. It is in essence an X to be interpreted in the light of all the circumstances affecting each case. Its value should be recognized (more so than was the case in some centers visited), but not over-emphasized. The problem should not be oversimplified.

J. E. Wallace Wallin, Ph.D., LL.D., is former Director of six Special Education Departments, fromer Director of eight Psychoeducational Clinics, former Professor of Clinical Psychology and Special Education, and is now retired, making his home at Lyndalia, Delaware.

It may be reemphasized that a "rich program of exploratory activities, especially craft activities, is perhaps the best means available for discovering the child's vocational interests and capabilities. In my experience, the method of trial on the job affords a more dependable technique in vocational guidance with the handicapped than the available standardized tests in the various fields of measurement . . . Few measuring instruments reveal the specific intellectual, motor, personality or other traits needed for success in specific occupations . . . We have no comprehensive tests of all-around vocational competency." Most of the existing standardized tests in any area are beyond the level of mental deficients. "Therefore . . . for some time to come our chief reliance in occupational prediction with the mentally handicapped will have to be a rich assortment of exploratory handwork." (Wallin, 1943). This conclusion was reached after several decades of groping with the problem. The crying desideratum in vocational guidance and placement of the mentally handicapped still remains the perfection of prognostic vocational tests, mainly along two lines: first, psychological tests, mainly of a performance nature, suitable for various levels of retardation: and, second, batteries of carefully selected and varied specimen of job activities of predictive significance administered under standardized test procedures. A beginning has recently been made along the line of the latter suggestion. (Jacobs-Weingold, 1958. and Weingold, undated.)

Without skilled screening much time and labor might be wasted and the center might become a bedlam. A committee on admissions, dismissals, and discharges may play a useful role, at least in the beginning.

2. Provide periodic evaluations of the work program for each trainee and the progress achieved in various jobs, and of his particular disabilities, abilities, interests, potentials, and needs. For this purpose use whatever standardized tests that are applicable. Use a wide range of exploratory job performances to discover latent proclivities and potentials. What can be utilized for exploration and training will depend on the range of occupational opportunities that exist in the local surrounding areas, although some contracts can be obtained from more distant points. The evaluations should include an appraisal of aspirations and the degree of effort put forth by the clients. Evaluations based on uninspired or unmotivated efforts are misleading and therefore often worse than worthless. Maintain adequate records of progress in the form of written reports, scores on tests, and samples of work done.

3. Devote a reasonable amount of time to overcoming scholastic, intellectual, and occupational handicaps; but when you have learned that they are insurmountable, as some of them will prove to be, concentrate on developing promising aptitudes and potentials. Otherwise you may spend so much time trying to overcome weaknesses that you will have no time to develop the trainee's strength. That would be tragic for the person concerned. Industry will judge the worker by the one thing he can do well, and

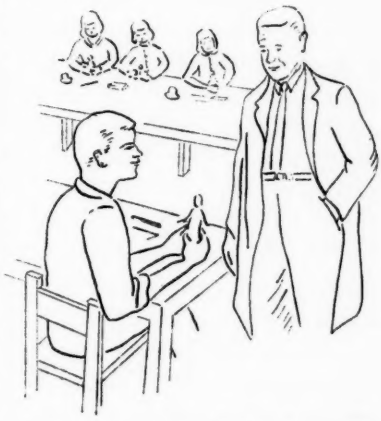
will not be much concerned with what he cannot do in other fields of endeavor. Fortunately many repetitious jobs can be performed satisfactorily with one learned skill. As already suggested, a wise rule to follow in your evaluations is to suspend judgment until you have motivated the trainee to put forth his best efforts and until you have discovered his particular occupational bent. There is a spark of responsiveness in even the lowliest.

4. Provide a continuous, unbroken program of socio-occupational preparation. This should be a major goal from the time the handicapped child enters the preschool, or the first grade, or the special class. It should likewise be a major goal all along in the home. (Wallin, 1955.) The child should be trained all along to assume greater and greater personal, social, and occupational responsibilities, with no sharp breaks or transition points in this continuous process of many-sided habilitation. He should gradually advance step by step, gaining mastery of tasks of ever-increasing complexity until he reaches the prevocational stage and the vocational stage of specific job preparation. Let him begin in early life with simple forms of motor and muscular training, both formal and informal, and with many simple forms of arts and crafts training, and proceed to more and more complicated ones. With such a background of early life adjustment (including the development of social skills) in the home and in the school, fitted to each stage of socio-occupational growth and development, the problems in the workshop will be greatly simplified, and permit concentration on specific job preparation. In some of the workshops visited little was offered beyond a program of diversified industrial arts, in some cases far less elaborate than offered in many school systems a generation ago (Wallin, 1924; Wallin, 1955.) Such programs of generalized handcraft work were not a waste of time, however, because this essential preliminary work had not been done in earlier stages.

5. As an extension or implication of the foregoing, develop skills in more complicated or complex jobs by breaking down the performance into simple steps. To give a crude illustration: many years ago in having children construct a play house it was clearly apparent that many did not possess enough elementary hand skills to enable them to hold a hammer, saw, or screw driver properly. They did not possess the rudimentary skills needed for hitting nails, sawing, and screwing. They would often hit the fingers with the hammer and refuse to make any further effort. So provision was made for preliminary practice in driving nails into blocks of wood in perfectly formal drill exercises (for which retardates have a predilection), first starting with larger ones and then proceeding to smaller and smaller ones; and also formal sawing exercises, first starting with random sawing and then proceeding to sawing accurately to line. After gaining command of these elementary skills, the child was entrusted with the job of nailing together properly fitted boards' in complicated projects. The end result served as a vital motive for the acquisition of the needed motor skills. We

often achieve better results by first gaining command of the constituent skills. Moreover, much factory work follows the assembly-line pattern of routine mechanism in which the job is split up into successive stages, each small part done by a different worker in the right order at the right time. Every worker must learn to cooperate in a definite sequence.

In St. Louis in the early part of the century it was found that many of the special-school graduates were employed in the shoe factories of the city. Later inspection revealed that the making of a shoe involved about a hundred mechanized operations. Each worker had to do his small part with mechanical precision. In this monotonous routine the mentally handicapped youth did even better than their normal peers. They stuck to the routine to which many of the normals could not adjust, and so there was a greater turn-over among the latter than among the former.



In his travels the writer found little if any use made of this divisional technique. The ingenious teacher will find many opportunities for the employment of cooperative work methods, sometimes with the use of special jigs for simplifying the processes. For example, in packaging products, one worker might fold the object; another place it in the container; another place containers in cartons; another fasten the carton; another put labels or markings on the cartons, etc. However, when this cooperative method is used, the trainees should change roles periodically in order to broaden the training base. The least that can be done is to familiarize all trainees with the assembly-line procedure used in the factories to which many workers will have to conform.

6. When the training and work programs are conducted in the same center, carry on the disparate activities in different rooms or in different parts of a large room, if possible, so that the one will not interfere with the other. It is particularly important that the trainees do not slow down the wage earners, who are vitally concerned with maintaining production schedules. Such interferences can doubtless be prevented by alert supervision even when all the activities occur in one room.

7. Get the best possible location for the workshop near the commercial establishments that will patronize it, so as to expedite incoming and outgoing shipments, and near transportation facilities for the trainees and employees. The building, preferably of one story, should afford ample space for office requirements, training and production rooms, rest rooms, halls, recreation and cafeteria rooms (from 80 to 100 square feet per client), and storage space, and needed adjoining parking space.

8. Conduct the workshop on business principles in strict compliance with the best business practice. Slipshod management of any phase of the activity should not be tolerated. This suggestion applies to many details: keeping records of monetary receipts from various sources and all payments; maintaining deposit accounts, with small revolving funds for incidentals and for necessary replacements; maintaining an adequate system of periodic budgeting; making periodic balance sheets; keeping accurate production records, sales accounts, and wages paid each worker; and the like. It is important to carry the necessary insurance to cover theft, fire losses, bodily injuries, social security, and worker's compensation. A special certificate may be obtained from the U. S. Department of Labor for the payment of lower wages than required by the Interstate Commerce Law. Wages as low as ten cents an hour may be paid for substandard workers.

Types of Possible Job Training in Workshops

The range of possibilities is almost limitless (Jacobs-Weingold, 1958; Weingold, undated; Wallin, 1955.) The following list is merely suggestive. It does not include hundreds of job outlets in the factories, industrial and commercial plants, farms, and homes. Note that not all these possibilities constitute so-called "nuisance jobs," which have been regarded as the specific job outlet for the mentally deficient.

1. Primary manufacture of a large variety of objects, goods, or merchandise from wood, metal, cotton, burlap, silk, rayon, nylon, plastics, rubber, cement, clay, ceramics, paper, etc., such as: kitchen, clothes pin, and carpenter aprons; shopping and laundry bags; slip covers, shredded foam rubber pillows; a great variety of fabrics for fabric shops; flower decorations; ribbon bows by hand or machine (e. g.), Magic Bow Tyer, (Minneapolis Mining and Manufacturing Co., St. Paul); seat swings for infants or young children; a great variety of ceramics, large and small-molding and firing in kilns.

2. Completing simple constituent parts for finished products, such as placing a gasket on a firing pin and tying knots near the ends of short cord used in fuses made for the army.

3. Assembling parts by hand manipulations to form completed wholes: toys, novelties, leather key cases, electronic parts.

4. Sorting objects according to specifications with respect to size, color, form, materials: nuts, bolts, screws, nails, buttons, papers, etc.

5. Packaging merchandise in cartons or containers, which may involve counting, arranging, fastening, labelling: neck ties, socks, gloves, hairnets, handkerchiefs, cutlery, electric bulbs, electronics; banding bundles of assorted construction paper, properly sorted, etc.

6. Affixing objects to display cards by lacing with self-locking devices, by taping, by the use of metal fasteners: tooth brushes, tooth paste tubes, watches, watch bands, pipes, key chains, metal initials, rules, wrenches, pad locks, pocket knives, toys, etc.

7. Glueing labels on knitting wool, bottles, boxes; glueing cut-out cardboards into boxes.

8. Processing newspapers: shredding for filling material with a shredder and baler; rolling newspapers into bundles for moving vans; making paper pillows for wholesale florists.

9. Printing with hand presses for individuals, firms, churches, clubs: letter heads, announcements, programs, forms, personalized napkins; stamping match books and other objects (The Kingsley Stamping Machine, Kingsley Machine Co., Hollywood, Calif., uses hot metal and would have to be used under supervision): monogramming; mimeographing.

10. Mailing operations by hand or by electric addressing machines: folding letters and circulars, fastening, stamping, mailing.

11. Making decorative work of varied kinds for party favors, novelty gifts, etc.

12. Conducting a comprehensive fixit shop for mending, cleaning, salvaging, repairing, or altering frayed, deteriorated, or broken materials of many kinds: garment alteration; furniture repairing or refinishing; upholstering; painting; bicycle repair.

13. Home arts services: dusting, sweeping, polishing, bedmaking, meal preparation, and serving, laundry services, mending and care of apparel, and household mechanics.

14. Building maintenance and wrecking.

15. Street cleaning and repairing.

16. Other types of service jobs in hospitals, factories, offices, service stations, gardens, farms: porter, floor boy, bus boy, stock boy, packer, nurse's helper, janitor's helper, kitchen helper, elevator operator, usher, washing, polishing and lubricating cars; messenger services in industrial plants, offices, hospitals, and schools.

It goes without saying that all work must be systematically inspected for flaws, that defective materials must not be incorporated in the finished product, and that adequate equipment is needed for a comprehensive coverage—work benches, looms, foot and power sewing machines, carpenter's tools, coping saws, power jig saws, power belt sanders, power drill presses, power saws, lathes, grinders, soldering tools, planes, kilns, and the like (Weingold, undated). It is equally important to emphasize that the shop should be conducted with utmost economy. None is self-supporting; all require public or private subsidy. The sales prices should include something for overhead to lessen the cost.

The Pay Off

Do all these costly efforts pay off in dollars and cents and in terms of human salvage? Is the expenditure justified? It is impossible to summarize the results of the numerous available studies bearing on this basic question (Wallin, 1955; Wallin, 1939.) A brief recap of the most recent investi-

gation by the Office of Vocational Rehabilitation must suffice here. During fiscal 1957 the Office reports that 1094 persons were rehabilitated under its program who had been on the rolls an average of 14 months from acceptance to placement. Of these, 94.2 per cent were unemployed when accepted; 48 per cent had never worked; 44.3 per cent received training, 4 per cent both training and physical restoration, and 47 per cent only guidance, counseling, and placement. The estimated earnings for this group in 1957 was $1,898,600 as compared with the estimated earnings of $44,700 before rehabilitation. From the scanty data supplied it is, unfortunately, impossible to evaluate these results satisfactorily. What is the degree of accuracy of the figures? What is the amount of variation between the "estimated" and the actual earnings? The figures are, confessedly, mere estimates. What is the degree of mental deficiency or distribution of the levels of retardation of the group involved? What is the difference in the effort at placement of the 1957 group and the earlier groups? In how many cases was any effort of placement made before 1957? Answers to all these questions must be supplied before it is possible properly to evaluate the results. This poses a definite research problem of vital import for the future. Nevertheless, the record as it stands is impressive. Let us emphasize that American industry affords over 25,000 jobs suitable for almost all levels of ability and aptitude. Our obligation is to train the mentally retarded of almost all levels to function at their highest levels in the varied pursuits of the workaday world. Let us afford even the "least of these" the opportunity to contribute their mite, however small. Let us allow them to become coworkers, however lowly, in the vast occupational fabric of our highly industrial society. This represents one of the fundamental rights of all minority groups in the free enterprise system of our American democratic credo.

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